

WU: ① What is the vertex of

$$y = ax^2 + bx + c$$
$$x = \frac{-b}{2a}$$

$$y = -3(x-2)^2 + 4 ?$$

$$(2, 4)$$

$$y = a(x-h)^2 + k$$

$(h, k)$  - vertex

② What do you need to multiply

$x+2$  by to get  $3x^2+6x$ ?

$$3x(x+2) = 3x^2 + 6x$$

factor ←

## Factoring Expressions

1)  $3x^2 - 27$

Find what's common  
w/ each term.

$$3(x^2 - 9)$$

"reverse distribute"

2)  $5x^2 - 20x$

$$5x(x - 4)$$

3)  $12x^2 + 20$

$$2(\underbrace{6x^2 + 10})$$

$$4(3x^2 + 5)$$

Binomial  $\rightarrow$  2 terms

## Factor Trinomial

"reverse FOILing"

1)  $x^2 - 9x + 20$

$(x+m)(x+n)$  when  $m \cdot n = 20$   
 $m + n = -9$

Factors of 20

$4 \cdot 5$      $-4 \cdot -5$  ← which adds to -9

$2 \cdot 10$      $-2 \cdot -10$

$1 \cdot 20$      $-1 \cdot -20$

$x^2 - 9x + 20 = (x-4)(x-5)$

FOIL  
first  
outer  
inner  
last

$x \cdot x - 5 \cdot x - 4 \cdot x - 5 \cdot -4$

$x^2 - 9x + 20$

$$x^2 + 3x - 12$$

$$\begin{array}{l}
 1 \quad -12 \\
 -1 \quad +12 \\
 -3 \quad -4 \\
 3 \quad -4 \\
 2 \quad -6 \\
 -6 \quad 2
 \end{array}$$

cannot be factored

$$\underline{x^2 - 3x - 18}$$

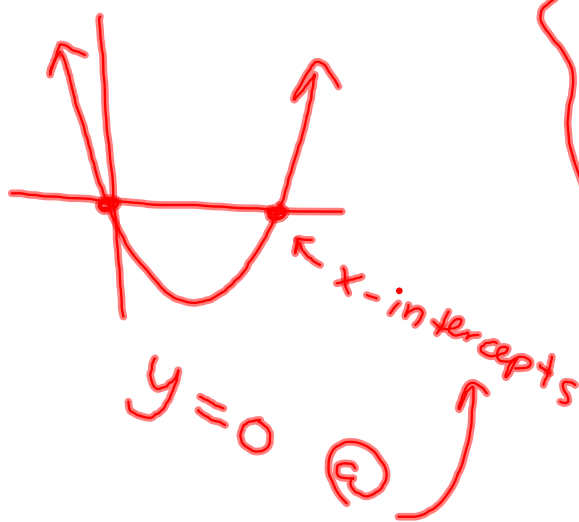
$$\text{factors } -6 \times 3$$

$$(x-6)(x+3)$$

$$\underline{r^2 + 2r - 63}$$

$$(r+9)(r-7)$$

Solve a quadratic equation.



$$y = x^2 + 6x + 5$$

$$0 = x^2 + 6x + 5$$

$$0 = (x+1)(x+5)$$

$$x = -1, -5$$

$\uparrow$   
 $y=0$  these are  
x-intercepts

## Special Cases

Difference  
of  
Squares.

$$a^2 - b^2 = (a+b)(a-b)$$

Ex |  $x^2 - 49 = (x+7)(x-7)$   
 $a=x$        $b=7$

Perfect Square  
Trinomial

$$a^2 + 2ab + b^2 = (a+b)^2$$

Ex |  $x^2 + 12x + 36 = (x+6)(x+6)$   
 $= (x+6)^2$

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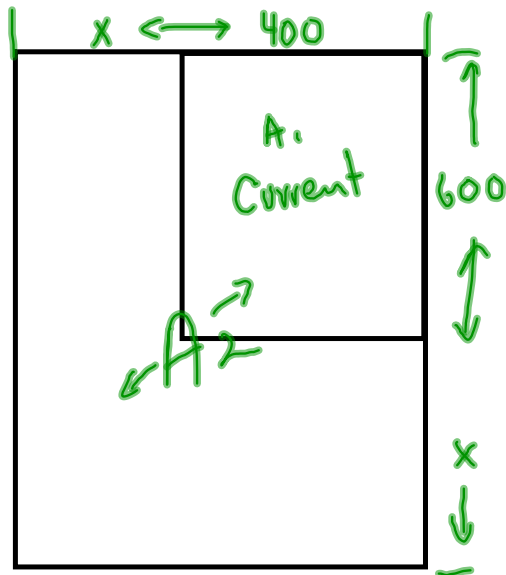
# 24-26

Read 254

P Ex 4.

Then Try

#65 on page  
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$$A_1 = 400 \times 600$$

$$= 240,000$$

$$A_2 = 2A_1 = 480,000$$

$$480,000 = (400 + x)(600 + x)$$

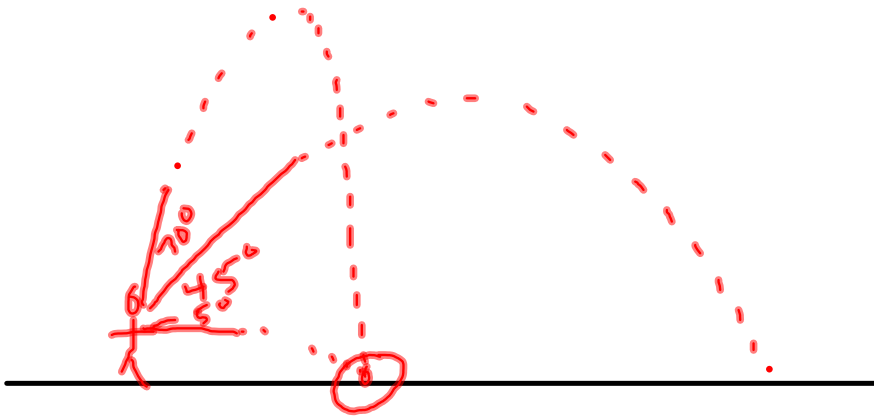
$$\begin{array}{r} 480,000 \\ -480,000 \end{array} = \begin{array}{r} 240,000 \\ -480,000 \end{array} + \underbrace{600x + 400x}_{1000x} + x^2$$

$$0 = x^2 + 1000x - 240,000 \quad \rightarrow \text{factor}$$

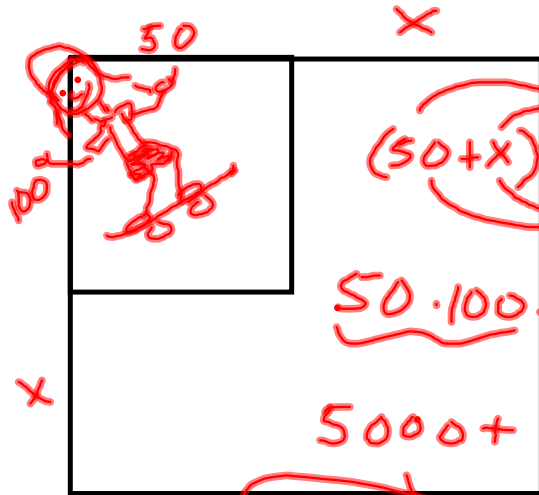
$$0 = (x + 1200)(x - 200)$$

$$x = -1200, 200$$





G5



$$(50+x)(100+x) = 3 \cdot 50 \cdot 100$$

$$50 \cdot 100 + 50x + 100x + x^2$$

$$5000 + 150x + x^2 = 15,000$$

$$x^2 + 150x = 10,000$$

$$x^2 + 150x + 5000 = 15,000$$
$$\quad \quad \quad -15000 \quad -15000$$

$$\begin{array}{l} 200 \cdot -50 \\ -200 \cdot 50 \\ -100 \cdot 100 \end{array}$$

$$x^2 + 150x - 10,000 = 0$$

$$(x - 50)(x + 200) = 0$$

$$x = 50, -200$$